

Transistor, PNP TO-3

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Description:

Complementary silicon power transistors.

The 2N6609 powerbase™ power transistors designed for high power audio, disk head positioners and other linear applications. These devices can also be used in power switching circuits such as relay or solenoid drivers, DC-DC converters or inverters.

Features:

- Pb-free packages
- High safe operating area (100% tested) 150W at 100V
- Completely characterized for linear operation
- High DC current gain and low saturation voltage
- $h_{FE} = 15$ (min.) at 8A, 4V
- V_{CE} (sat) = 1.4V (max.) at $I_C = 8A$, $IB = 0.8A$
- For low distortion complementary designs

Maximum Ratings

| Rating | Symbol | Value | Unit |
|--|----------------|--------------|--------------------|
| Collector-Emitter Voltage | V_{CEO} | 140 | V DC |
| Collector-Emitter Voltage | V_{CEX} | 160 | |
| Collector-Base Voltage | V_{CBO} | | |
| Emitter-Base Voltage | V_{EBO} | 7 | |
| Collector Current - Continuous - Peak (Note 2) | I_C | 16 30 | A DC |
| Base Current - Continuous - Peak (Note 2) | I_B | 4 15 | |
| Total Power Dissipation at $T_A = 25^\circ C$ Derate above $25^\circ C$ | P_D | 150 0.855 | W W/ $^\circ C$ |
| Operating and Storage Junction Temperature Range | T_J, T_{Stg} | -65 to +200 | $^\circ C$ |

Thermal Characteristics

| Characteristic | Symbol | Max. | Unit |
|-------------------------------------|-----------------|------|--------------|
| Thermal Resistance Junction to Case | $R_{\theta JC}$ | 1.17 | $^\circ C/W$ |

Max. ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. Indicates JEDEC Registered Data.
2. Pulse Test: Pulse Width = 5ms, Duty Cycle $\leq 10\%$.

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Electrical Characteristics ($T_c = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min. | Max. | Unit |
|----------------|--------|------|------|------|
|----------------|--------|------|------|------|

Off Characteristics (Note 3)

| | | | | |
|--|-----------------------|-----|---------|-------|
| Collector-Emitter Breakdown Voltage (Note 4) ($I_C = 0.2\text{A DC}$, $I_B = 0$) | $V_{EO(\text{sus})}$ | 140 | - | V DC |
| Collector-Emitter Sustaining Voltage (Note 4) ($I_C = 0.1\text{A DC}$, $V_{BE(\text{off})} = 1.5\text{V DC}$, $R_{BE} = 100\Omega$) | $V_{CEX(\text{sus})}$ | 160 | - | |
| Collector-Emitter Sustaining Voltage ($I_C = 0.2\text{A DC}$, $R_{BE} = 100\Omega$) | $V_{CER(\text{sus})}$ | 150 | - | |
| Collector Cut off Current (Note 4) ($V_{CE} = 120\text{V DC}$, $I_B = 0$) | I_{CEO} | - | 10 | mA DC |
| Collector Cut off Current (Note 4) ($V_{CE} = 140\text{V DC}$ $V_{BE(\text{off})} = 1.5\text{V dc}$) ($V_{CE} = 140\text{V DC}$ $V_{BE(\text{off})} = 1.5\text{V DC}$, $T_c = 150^\circ\text{C}$) | I_{CEX} | - | 2 10 | |
| Collector Cut off Current ($V_{CB} = 140\text{V DC}$, $I_E = 0$) | I_{CBO} | - | 2 | |
| Emitter Cut off Current (Note 4) ($V_{BE} = 7\text{V DC}$, $I_C = 0$) | I_{EBO} | - | 5 | |

On Characteristic (Note 3)

| | | | | |
|---|----------------------|---------|----------|------|
| DC Current Gain ($I_C = 8\text{A DC}$, $V_{CE} = 4\text{V DC}$) (Note 4) ($I_C = 16\text{A DC}$, $V_{CE} = 4\text{V DC}$) | h_{FE} | 15 5 | 60 - | - |
| Collector-Emitter Saturation Voltage ($I_C = 8\text{A DC}$, $I_B = 800\text{mA DC}$) (Note 4) ($I_C = 16\text{A DC}$, $I_B = 3.2\text{A DC}$) | $V_{CE(\text{sat})}$ | - | 1.4 4 | V DC |
| Base-Emitter On Voltage (Note 4) ($I_C = 8\text{A DC}$, $V_{CE} = 4\text{V DC}$) | $V_{BE(\text{on})}$ | - | 2.2 | |

Dynamic Characteristics

| | | | | |
|--|------------|----|---|---|
| Magnitude of Common-Emitter Small-Signal, Short-Circuit, Forward Current Transfer Ratio ($I_C = 1\text{A}$, $f = 50\text{kHz}$) | $ h_{fe} $ | 4 | - | - |
| Small-Signal Current Gain (Note 4) ($I_C = 1\text{A DC}$, $V_{CE} = 4\text{V DC}$, $f = 1\text{kHz}$) | h_{fe} | 40 | - | - |

Second Breakdown Characteristics

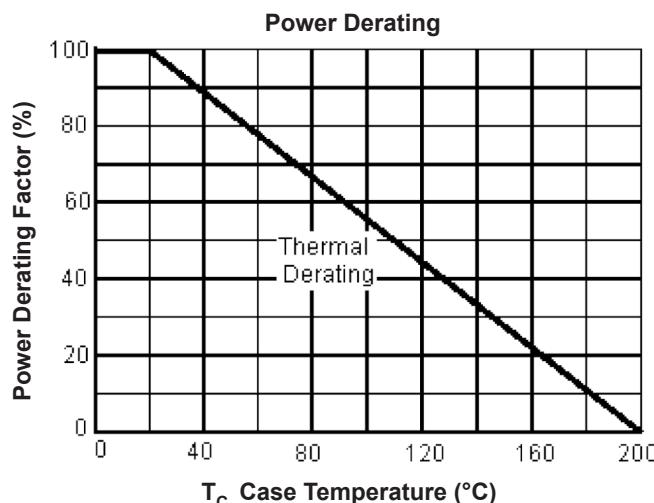
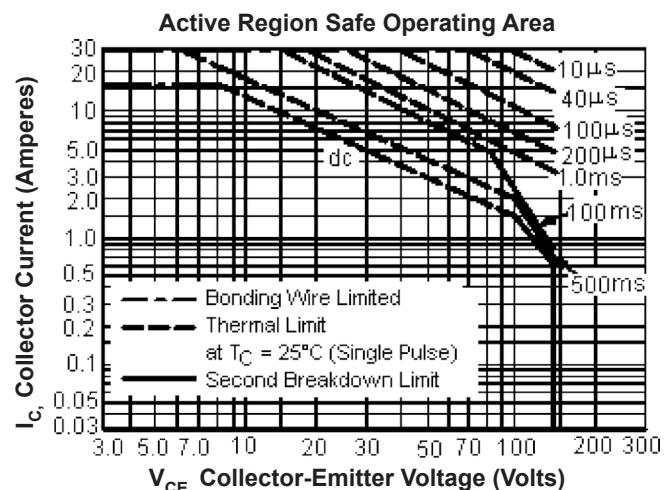
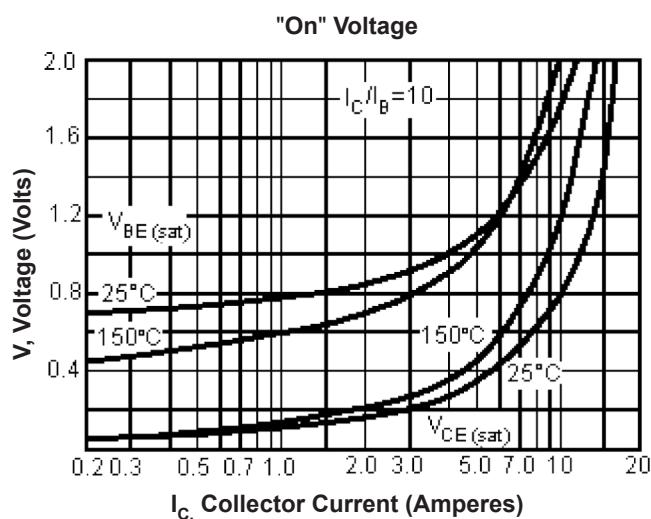
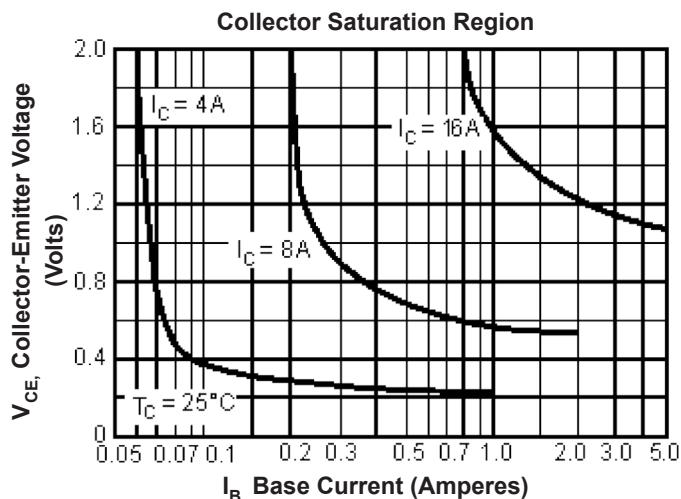
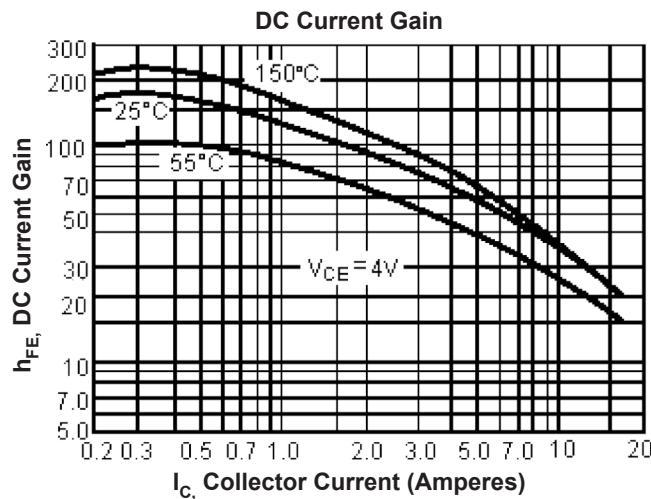
| | | | | |
|---|-----------|-----|---|-----|
| Second Breakdown Collector Current with Base Forward Biased $t = 1\text{s}$ (non-repetitive), $V_{CE} = 100\text{V}$ | $I_{S/b}$ | 1.5 | - | ADC |
|---|-----------|-----|---|-----|

Note:

3. Pulse Test : Pulse Width = 300 μs , Duty Cycle $\leq 2\%$.
4. Indicates JEDEC Registered Data.

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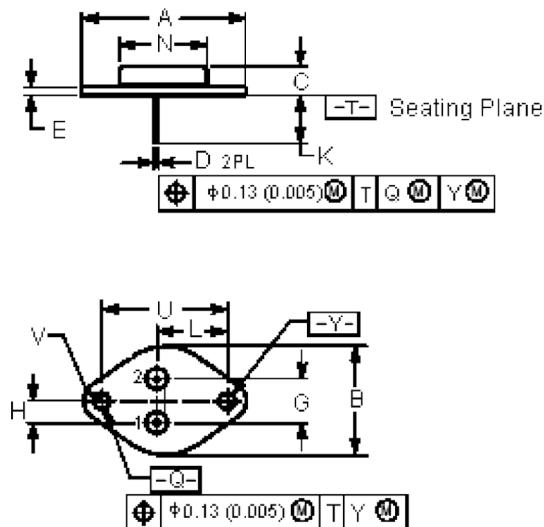
There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate I_C - V_{CE} limits of the transistor that must be observed for reliable operation: i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data is based on $T_{J(\text{pk})} = 200^\circ\text{C}$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(\text{pk})} < 200^\circ\text{C}$. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

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Dimensions:



| Dimensions | Min. | Max. |
|------------|------------------------|--------------|
| A | 1.55 (39.37) Reference | |
| B | - | 1.05 (26.67) |
| C | 0.25 (6.35) | 0.335 (8.51) |
| D | 0.038 (0.97) | 0.043 (1.09) |
| E | 0.055 (1.4) | 0.07 (1.77) |
| G | 0.43 (10.92) BSC | |
| H | 0.215 (5.46) BSC | |
| K | 0.44 (11.18) | 0.48 (12.19) |
| L | 0.665 (16.89) BSC | |
| N | - | 0.83 (21.08) |
| Q | 0.151 (3.84) | 0.165 (4.19) |
| U | 1.187 (30.15) BSC | |
| V | 0.131 (3.33) | 0.188 (4.77) |

Dimensions : Inches (Millimetres)

Pin Configuration:

1. Base
2. Emitter
- Collector (Case)

Part Number Table

| Description | Part Number |
|-----------------------|-------------|
| Transistor, PNP, TO-3 | 2N6609 |

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